

WHAT IS CLAIMED IS

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1. A loss point detecting method for determining whether or not a loss point occurs in an optical transmission path, in a distributed Raman amplifier which amplifies a signal light with a use  
10 of the optical transmission path as an amplifying medium by applying an excitation light to the optical transmission path in a direction opposite to a direction in which the signal light is transmitted there, comprising the steps of:

15 a) monitoring a scattered light separating from the optical transmission path;

b) separating a part of the excitation light and monitoring it;

20 c) separating a reflected light which passes in a direction opposite to the direction in which the excitation light passes through the optical transmission path, and monitoring it; and

d) determining, when a power of the excitation light monitored reaches a predetermined  
25 determination value, whether or not a loss point occurs, based on a ratio between a power of the scattered light monitored and a power of the reflected light monitored.

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2. A loss point detecting method for determining whether or not a loss point occurs in an  
35 optical transmission path, in a distributed Raman amplifier which amplifies a signal light with a use of the optical transmission path as an amplifying

medium by applying an excitation light to the optical transmission path in a direction opposite to a direction in which the signal light is transmitted there, comprising the steps of:

- 5                   a) monitoring a scattered light separating from the optical transmission path;
- b) separating a part of the excitation light and monitoring it; and
- c) determining, when a power of the
- 10 excitation light monitored reaches a predetermined determination value, whether or not a loss point occurs, based on a power of the scattered light monitored.

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3. A distributed Raman amplifier which amplifies a signal light with a use of an optical transmission path as an amplifying medium by applying an excitation light to the optical transmission path in a direction opposite to a direction in which the signal light is transmitted there, comprising:

25                   a scattered-light monitoring part monitoring a scattered light separating from the optical transmission path;

                  an excitation-light monitoring part separating a part of the excitation light and

30 monitoring it;

                  a reflected-light monitoring part separating a reflected light which passes in a direction opposite to the direction in which the excitation light passes through the optical

35 transmission path, and monitoring it;

                  a determining part determining, when a power of the excitation light monitored reaches a

predetermined determination value, whether or not any loss point occurs, based on a ratio between a power of the scattered light monitored and a power of the reflected light monitored; and

5           a breaking part stopping the application  
of the excitation light when said determining part  
determines that a loss point occurs.

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4. A distributed Raman amplifier which amplifies a signal light with a use of an optical transmission path as an amplifying medium by applying an excitation light to the optical transmission path in a direction opposite to a direction in which the signal light is transmitted there, comprising:

a scattered-light monitoring part  
20 monitoring a scattered light separating from the  
optical transmission path;

an excitation-light monitoring part  
separating a part of the excitation light and  
monitoring it;

25           a reflected-light monitoring part  
separating a reflected light which passes in a  
direction opposite to the direction in which the  
excitation light passes through the optical  
transmission path, and monitoring it;

30           a determining part determining whether or  
not a loss point occurs, with increasing a power of  
the excitation light at a fixed rate, and comparing  
a time required for a power of the scattered light  
monitored to reach a fixed value with a time  
35 required for a power of the reflected light  
monitored to reach a fixed value; and

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a breaking part stopping the application
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of the excitation light when said determining part determines that a loss point occurs.

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5. A distributed Raman amplifier which amplifies a signal light with a use of an optical transmission path as an amplifying medium by  
10 applying an excitation light to the optical transmission path in a direction opposite to a direction in which the signal light is transmitted there, comprising:

a scattered-light monitoring part  
15 monitoring a scattered light separating from the optical transmission path;

an excitation-light monitoring part separating a part of the excitation light and monitoring it;

20 a determining part determining, when a power of the excitation light monitored reaches a predetermined determination value, whether or not any loss point occurs, based on a power of the scattered light monitored; and

25 a breaking part stopping the application of the excitation light when said determining part determines that a loss point occurs.

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6. The distributed Raman amplifier as claimed in claim 3, wherein:

said determining part determines, when the  
35 power of the excitation light monitored reaches the predetermined determination value, that a loss point occurs when the ratio the power of the reflected

light monitored with respect to the power of the scattered light monitored exceeds a predetermined value.

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7. The distributed Raman amplifier as claimed in claim 3, further comprising:

10       a first band separating optical coupler separating only the scattered light from the optical transmission path.

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8. The distributed Raman amplifier as claimed in claim 4, further comprising:

20       a first band separating optical coupler separating only the scattered light from the optical transmission path.

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9. The distributed Raman amplifier as claimed in claim 5, further comprising:

30       a first band separating optical coupler separating only the scattered light from the optical transmission path.

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10. The distributed Raman amplifier as claimed in claim 3, further comprising:

      a second band separating optical coupler

separating the scattered light from the signal light  
and scattered light separated from the optical  
transmission path by means of an optical coupler.

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11. The distributed Raman amplifier as  
claimed in claim 4, further comprising:

10 a second band separating optical coupler  
separating the scattered light from the signal light  
and scattered light separated from the optical  
transmission path by means of an optical coupler.

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12. The distributed Raman amplifier as  
claimed in claim 5, further comprising:

20 a second band separating optical coupler  
separating the scattered light from the signal light  
and scattered light separated from the optical  
transmission path by means of an optical coupler.